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Effect of the cytoskeleton modifiers on the water-holding capacity of winter wheat tissues

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Abstract

Effects of the inhibitors of the cytoskeletal framework, 10 μM cytochalasin and 1 mM colchicine, on the tissue water-holding capacity (WHC) in winter wheat (Triticum aestivum L.) seedlings were studied. WHC was defined as the amount of water that could not be extracted by 20% polyethylene glycol (PEG-6000). The inhibitors decreased WHC. Severe water stress (30% PEG) and the membranetropic compound pipolphene both further augmented the effects of cytochalasin and colchicine. A low concentration (5 μM) of exogenous calcium prevented and a high concentration (1 mM) enhanced the inhibitor action. A relationship between WHC and the integrity of the cytoskeleton components was proposed, and WHC dependence on the cellular Ca2+ concentration was shown. Destructive changes in the cytoskeletal framework result in the reduction of the total water-holding surfaces of the cytoskeletal filaments and associated macromolecules and, as a consequence, in changes of the cellular water state and a decrease in tissue WHC.

Keywords

Inhibitors of the cytoskeletal framework, Triticum aestivum, Water-holding capacity